

We claim:

1. A metal alloy product having a diffusion coating on at least one surface, the product comprised of:

a workpiece formed from an iron, nickel, cobalt or copper base alloy, the workpiece having at least one surface to which a diffusion coating is applied,
an aluminum silicon diffusion coating diffused into at least one surface of the workpiece, the coating having a thickness greater than 180 microns.

2. The metal alloy of claim 1 wherein the workpiece is selected from the group consisting of sheet, tubes, piping, heat exchanger parts, storage tanks and reaction vessels.

3. The metal alloy product of claim 1 wherein the diffusion coating contains at least 15% aluminum.

4. The metal alloy product of claim 1 wherein the diffusion coating is applied by pack cementation.

5. The metal alloy product of claim 1 wherein the diffusion coating has a thickness of at least 200 microns.

6. The metal alloy product of claim 1 wherein the diffusion coating has a thickness of at least 250 microns.

7. The alloy product of claim 1 wherein the diffusion coating is applied by:
 - a. preparing a diffusion mixture consisting essentially of by weight 1% to 5% aluminum, 0.5% to 5% silicon, 0.25% to 3% ammonium halide activator and the balance an inert filler;
 - b. placing the diffusion mixture in a retort with the alloy product to be coated so that the diffusion mixture covers those surfaces of the product which are to be coated; and
 - c. heating the retort to a sufficiently high temperature to cause aluminum and silicon in the mixture to diffuse onto at least one surface of the alloy product forming an aluminum silicon coating.
8. The metal alloy product of claim 4 wherein the retort is heated to an interior temperature of from 650° to 1150°C.
9. The metal alloy of claim 7 wherein the diffusion mix contains at least 5% by weight of aluminum and at least 0.5% by weight of ammonium chloride.
10. The method of claim 1 wherein the coating is applied by surface chemical diffusion from at least one of a composite pack mix-binder sheet and a composite pack mix-binder insert which contains the diffusion mixture.
11. A metal alloy product having an aluminum-silicon diffusion coating on at least one surface, the aluminum and silicon diffusion coating being at least 200 microns thick and formed by the steps of:

- a. preparing a diffusion mixture consisting essentially of by weight 1% to 5% aluminum, 0.5% to 5% silicon, 0.25% to 3% ammonium halide activator and the balance an inert filler;
- b. placing the diffusion mixture in a retort with the alloy product to be coated so that the diffusion mixture covers those surfaces of the product which are to be coated; and
- c. heating the retort to a sufficiently high temperature to cause aluminum and silicon in the mixture to diffuse onto at least one surface of the alloy product forming an aluminum-silicon coating having a thickness of at least 200 microns.

12. The metal alloy product of claim 11 wherein the activator is selected from the group consisting of ammonium fluoride, ammonium chloride, ammonium bromide, and ammonium iodide.

13. The metal alloy product of claim 11 wherein the coating is applied by surface chemical vapor diffusion from at least one of a pack mix-binder composite sheet and a composite pack mix-binder insert which contains the pack mixture.

14. The metal alloy product of claim 11 wherein the activator is selected from the group consisting of ammonium fluoride, ammonium chloride, ammonium bromide, and ammonium iodide.

15. The metal alloy product of claim 11 wherein the diffusion mix contains at least 5% by weight aluminum and at least 0.5% ammonium chloride.